PUB-NO: EP000205409A1

DOCUMENT-IDENTIFIER: EP 205409 A1

TITLE: Adjustable seat for motor vehicles.

PUBN-DATE: December 17, 1986

INVENTOR-INFORMATION:

NAME	COUNTRY
DAL, MONTE ANTONIO	N/A

ASSIGNEE-INFORMATION:

NAME	COUNTRY
FIAT AUTO SPA	IT

APPL-NO: EP86830088

APPL-DATE: April 16, 1986

PRIORITY-DATA: IT06744485A (May 15, 1985)

INT-CL (IPC): B60N001/02

EUR-CL (EPC): B60N002/02 ; B60N002/04

US-CL-CURRENT: 297/316, 297/321 , **297/383**

ABSTRACT:

CHG DATE=19990617 STATUS=O> Separate support means (5,7 ; 5,6) are provided for the cushion (4) and the back (2) so that separate adjusting movements can be imparted to the cushion (4) and the back (2) along respective translation paths. The support means for the cushion (4) and the back (2) are connected together kinematically (5) in such a way that the movement of one of the cushion (4) and the back (2) involves the movement of the other of the cushion (4) and the back (2), and the extent of movement of the cushion (4) is a fraction of the extent (2) of movement of the back.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 205 409**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 86830088.0

(51) Int. Cl.⁴: B60N 1/02

(22) Date of filing: 16.04.86

(30) Priority: 15.05.85 IT 6744485

(43) Date of publication of application:
17.12.86 Bulletin 86/51

(84) Designated Contracting States:
DE FR GB SE

(71) Applicant: FIAT AUTO S.p.A.
Corso Giovanni Agnelli 200
I-10135 Torino(IT)

(72) Inventor: Dal Monte, Antonio
Via Flaminia 395
I-00196 Roma(IT)

(74) Representative: Bosotti, Luciano et al
c/o Jacobacci-Casetta & Perani S.p.A. Via Alfieri, 17
I-10121 Torino(IT)

(54) **Adjustable seat for motor vehicles.**

(57) Separate support means (5,7 ; 5,6) are provided for the cushion (4) and the back (2) so that separate adjusting movements can be imparted to the cushion (4) and the back (2) along respective translation paths. The support means for the cushion (4) and the back (2) are connected together kinematically (5) in such a way that the movement of one of the cushion (4) and the back (2) involves the movement of the other of the cushion (4) and the back (2), and the extent of movement of the cushion (4) is a fraction of the extent (2) of movement of the back.

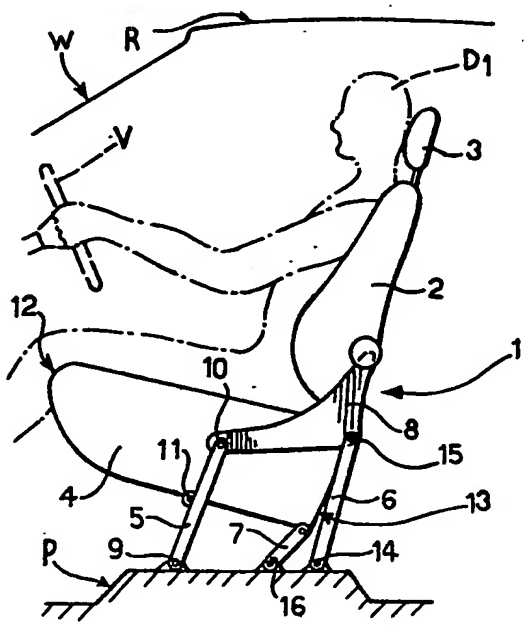


FIG. 1

EP 0 205 409 A1

Adjustable seat for motor vehicles

The present invention relates to seats for motor vehicles and is particularly concerned with a motor vehicle seat comprising a cushion, a back, and support means for the seat which allow an adjusting movement to be imparted to the seat in a longitudinal direction relative to the structure of the motor vehicle.

Seats of the above-specified type are currently in use in the motor-car industry. The longitudinal adjusting movement allows the position of the seat to be adopted to the different anthropometric characteristics, preferences or habits of the driver or passengers of the motor vehicle.

In general, drivers or passengers of tall stature tend to move the seat backwards, away from the steering wheel and pedals or the dashboard, while drivers and passengers of small stature tend to move the seat forwards. Although known types of adjustable seat normally provide for the possibility of varying the orientation of the back relative to the cushion, the cushion and the back maintain a fixed relative position during the longitudinal adjusting movement.

This means that the overall length of the cushion (that is, the distance between the front edge of the cushion and the back) remains fixed, regardless of the position adopted by the seat. A predetermined value is therefore chosen for this length, selected in relation to the mean thigh length of the "motoring population". Since the range of variation of this length is rather wide (10 cm. or more according to statistical records) in drivers and passengers whose anthropometric data are at the extremes of this range, conditions of discomfort can arise.

More particularly, with drivers or passengers of tall stature, a situation can arise in which the thighs are not supported for a sufficient length. For drivers or passengers of small stature, however, the phenomenon known as "raised limb" can arise due to the fact that the distal portion of the thigh is supported too much and is lifted up by the front edge of the cushion, so that an undesirable pressure is created in the popliteal space (that is, in the region behind the knee) not only during operation of the pedals but also in the rest position.

The object of the present invention is to provide an adjustable seat which allows the aforesaid disadvantages to be remedied.

According to the present invention, this object is achieved by a seat of the type specified above, characterised in that:

-at least partially separate support means are provided for the cushion and the back so that separate adjusting movements can be imparted to the cushion and the back along respective translation paths, and

-the support means for the cushion and the back are connected together kinematically in such a way that the movement of one of the cushion and the back involves the movement of the other of the cushion and the back, and the extent of movement of the cushion is a fraction (preferably of the order of a half) of the extent of movement of the back.

Due to this characteristic, an adjustable seat is achieved in which the overall length of the cushion varies in relation to the position of the seat, increasing when the car seat is moved backwards - (drivers and passengers of tall stature) and decreasing when the seat is moved forwards (drivers and passengers of small stature).

According to one presently preferred embodiment, the support means for the back are shaped so as to keep the back in a constant orientation relative to structure of the motor vehicle during the adjusting movement of the back, while the support means for the cushion impart a tilting movement to the cushion during its translation in the forward direction relative to the structure of the motor vehicle, which causes the raising of the rear edge of the cushion.

In other words, the longitudinal sliding of the cushion and the movement of the back take place in different planes. In this way,that portion of the seat which supports the lumbosacral region of the spinal column of the driver or passenger modifies its overall configuration during the adjustment movement and acts such that the point of maximum lordosis,that is, of maximum forward curvature of the spinal column, is anatomically correct both for subjects of tall stature and for subjects of small stature.

The invention will now be described,purely by way of non-limiting example,with reference to the appended three figures of drawings indicated by the references 1 to 3.

Figures 1 and 2 illustrate diagrammatically, in side elevation, an adjustable seat according to the invention in two possible positions of use.

In particular, Figure 1 relates to the use of the seat according to the invention by a driver or a passenger of tall stature, while Figure 2 relates to the use of the seat by a driver or passenger of small stature.

Figure 3 illustrates diagrammatically one possible variant of the invention.

In the drawings, an adjustable seat for motor vehicles is indicated 1. The drawings relate particularly to a seat intended to be occupied by the driver of a motor car.

The floor P of the passenger compartment, the front portion R of the roof, the windscreen W and steering wheel V of this car, which is not illustrated in its entirety, are shown diagrammatically.

The profile of the driver occupying the seat is illustrated diagrammatically by dashed lines in Figure 1 and chain lines in Figure 2.

As already mentioned above, Figure 1 relates to the use of the seat by a driver or passenger of tall stature D_1, while Figure 2 relates to the use of the seat 1 by a driver of small stature D_2.

Recognizable in the seat 1 are a back 2 provided with a head rest 3 at its upper end, and a largely horizontal element 4, which defines the sitting plane of the seat and, for brevity, is referred to as the "cushion" in this description and in the claims that follow.

The seat 1 according to the invention is an adjustable seat, that is, a seat to which a translational movement in the longitudinal direction relative to the structure of the motor vehicle can be imparted to adapt the position of the seat 1 to the anthropometric characteristics of the driver or passenger occupying it.

The seat 1 is mounted on the floor P of the passenger compartment of the motor vehicle by an adjustable support and guide device comprising, on at least one side of the seat 1, three pivotable arms, indicated 5, 6 and 7, and a horizontally-extending arm 8 connected to the side of the back 2 so that it is in fact fixed to the back 2.

It must be stated, however, that this representation is diagrammatic and is limited to the illustration only of parts essential to the understanding of the invention. The engagement or fixing elements which allow the seat 1 to be locked in a fixed position of the translational movement, selectively identified according to the anthropometric characteristics, preferences and habits of the driver or passenger, and possible orienting devices which permit the selective variation of the inclination of the back 2 relative to the cushion 4 are not shown here since they are not relevant to the understanding of the invention. The arms 5, 6 and 7 are intended to make the back 2 and the cushion 4 follow different translation paths in the longitudinal adjusting movement of the seat 1.

As indicated above, according to a preferred embodiment, two identical support and guide devices, comprising the pivotable arms 5, 6, 7 and the horizontal arm 8, are placed on both sides of the seat 1. Since these device are wholly identical to each other, the structure and operating criteria of only one of them will be described in detail below.

In the first pivotable arm 5 there can be distinguished essentially:

-an end 9 hinged to the floor P of the passenger compartment, which defines the horizontal axis about which the arm 5 pivots,

-a free end 10 at which the pivotable arm 5 is hinged to the free end of the horizontal arm 8 which extends forwardly from the back 2, and

-an intermediate region 11(preferably central, that is, located halfway between the ends 9 and 10) at which the first arm 5 is hinged to the cushion 4 of the seat in a position intermediate the front edge 12 and the rear edge 13 of the cushion 4.

On the other hand, in the second pivotable arm 6, whose overall length is substantially equal to that of the arm 5, there can be distinguished:

-an end 14 hinged to the floor P of the passenger compartment, and

a free end end 15 at which the arm 6 is hinged to the horizontal arm 8 in that region of the arm 8 connected to the back 2.

The free ends 10 and 15 of the arms 5 and 6 are hinged to the horizontal arm 8 at a distance practically identical to the distance separating the ends 9 and 14 at which the arms 5 and 6 are hinged to the floor P.

The dimensions and configuration of assembly of the arms 5, 6 and 8 are therefore such that the back 2 maintains a fixed orientation relative to the structure of the vehicle during the longitudinal translational movement imparted to the back to enable its adaptation to the anthropometric characteristics of a driver or passenger.

To be precise, it should be observed that the longitudinal translational movement of the back 2 relative to the structure of the motor vehicle does not occur along a straight path but along an approximately circular or arcuate path the extent of which is determined by the length (identical) of the arms 5 and 6.

In the third arm, however, there can be distinguished a hinge end 16 fixed to the floor P in a position intermediate the ends 9 and 14 of the arms 5 and 6, and an end 17 hinged to the cushion 4 in correspondence with the rear edge 13 of the cushion 4.

The overall length of the third pivotable arm 7, that is, the distance which separates the hinge end 16 from the free end 17, is slightly less than the distance which, in the first pivotable arm 5, sepa-

rates the hinge end 9 from the central region 11 of hinging to the cushion 4. This latter distance, as seen, is equal to about half the overall length of the first arm 5.

The cushion 4 is therefore supported by support means at least partially separate from those which support the back 2. Consequently, during the translational movement of the seat 1, the cushion 4 follows a path which is different from that followed by the back 2.

The path of the cushion 4 is also a roughly horizontal path consisting more precisely of an approximately circular or arcuate path the extent of which is defined substantially by the distance which, in the first pivotable arm 5, separates the hinge end 9 from the central region 11 of hinging to the cushion 4. Consequently, when the back 2 is moved longitudinally relative to the structure of the passenger compartment causing pivoting of the arms 5 and 6, the cushion 4 also effects a similar movement. In other words, the cushion 4 moves forward when the back 2 is moved forward, and moves back when the back 2 is moved back towards the rear end of the motor vehicle.

Naturally, the relationship of the kinematic effect can be reversed: in fact, it can be the back 2 which moves due to a movement of the cushion 4.

In each case, the extent of movement of the cushion 4 is linked to the extent of the movement of the back 2 and, more precisely, is a fraction thereof equal to about half. The cushion 4 is in fact connected to the arm 5 in a region 11 located, with respect to the hinge point 9 of the arm 5, at a distance equal to about half the distance between the hinge point and the free end 10 to which the arm 8 fixed to the back is connected. Consequently, for a given angular extent of pivoting of the arm 5, the travel of the cushion 4 will be equal to about half the travel of the back 2.

In other words, when the back 2 is moved forwardly towards the steering wheel V by a predetermined distance, the cushion 4 also moves forwardly towards the steering wheel V by a distance equal to about half the distance of movement of the back 2.

On the contrary, when the back 2 is moved backwards, the cushion 4 goes back by a distance equal to about half the distance covered by the back 2.

Adjustment of the position of the seat 7 therefore involves a corresponding variation in the length of the sitting plane defined by the cushion 4, that is, of the distance between the front end 12 and the rear end 13 of the cushion.

Thus, there is an exact adaptation of the length of the sitting plane to the diverse anthropometric characteristics of the driver or passenger occupying the seat.

More particularly, drivers or passengers of tall stature D_1, who adjust the seat 1 by moving the back 2 away from the steering wheel V,pedals or dashboard, have a longer sitting plane available than that used by drivers or passengers of small stature D_2 who adjust the seat 1 by moving the back 2 towards the steering wheel,pedals or dashboard.

One thus avoids the thighs of drivers or passengers of tall stature being supported over an insufficient length and the occurence of the phenomenon defined as "raised limb" in drivers or passengers of small stature.

At the same time, the length of the third pivotable arm 7, located intermediate the arms 5 and 6, is chosen in such a manner that in its longitudinal translational movement relative to the structure of motor vehicle, the cushion 4 will also be subjected to a rotational or tilting movement so that, when the cushion 4 moves forwardly towards the front of the motor vehicle, the front edge 12 is lowered and the rear edge 13 is raised towards the back 2.

The occurrence of this tilting of the cushion 6 means that the seat 1 of the invention adapts itself in the optimum manner to the lumbosacral region of the spinal column of the driver or passenger occupying the seat. In particular, the point of maximum lordosis, that is, the point of maximum forward curvature of the spinal column, is maintained in the correct position both for subjects of tall stature and subjects of small stature.

For subjects of tall stature (Figure 1) who use the seat 1 in a position away from the steering wheel, pedals or dashboard, the area of the back intended to support the lumbosacral region of the spinal column of the person in the seat is in fact located at a greater distance from the upper surface of the cushion 4 than that which separates the said area of the back from the upper surface of the seat 4 when the seat 1 is moved forwardly (Figure 2) for use by a person of small stature.

Naturally, that explained above is only one of the mechanisms which permit the realization of the present invention. For another example of a mechanism of this type, reference can be made to the variant illustrated diagrammatically in Figure 3.

In this case (normally in correspondence with both sides of the seat 1) the cushion 4 is supported adjacent its front edge 12 by a first pivotable arm 101. The arm 101 is hinged to the floor P at its lower end 102 and is connected to the cushion 4 at its upper end 103.

Adjacent the rear edge 13 of the cushion 4 on each side of the seat 1 is mounted a shaped arm constituted, in the example illustrated, by a plate 104 in the form of a scalene triangle having the two vertices adjacent its major side connected to the floor P and the back 2 at two hinge points indicated

105 and 106 respectively. The plate 104 is also connected to the cushion 4 at a hinge point 107 located adjacent its other vertex which, with respect to the major side of the plate 104, is on the side opposite the front edge 12 of the cushion 4.

Therefore, in this case also, the cushion 4 and the back 2 are connected to a single pivoting arm - (the plate 104) hinged to the floor P of the passenger compartment. The distance separating the cushion 4 from the point 105 of hinging of the pivoting arm 104 to the floor, however, is less than the distance between the hinge point 105 and the back 2. Consequently, when the arm 104 is pivoted in order to adjust the position of the seat 1 (for example, from the moved back position K illustrated by a continuous line towards the forward position K' illustrated by a broken line and vice versa), for a given angular travel of the arm 104, the cushion 4 describes a path whose extent is a fraction of the extent of the path travelled by the back 2.

Moreover, the fact that the rear edge 13 of the cushion 4 is hinged to the plate 104 at the vertex 107 opposite the major side (the vertex facing the rear of the seat 1) means that rear edge 13 of the cushion 4, is raised in the forward translational movement but is lowered during translation in the opposite direction. It is thus possible to effect, through a tilting movement of the cushion 4 which is superimposed on the translational movement of the cusion 4, the optimum adaptation to the lumbosacral region of the spinal column of the person occupying the seat 1 described above with reference to the embodiment of Figures 1 and 2.

The extent of the tilting movement of the cushion 4 can be determined, relative to the distance between the hinge points 105 and 107 of the plate 104, by acting upon the length of the pivotable arm 103 which supports the cushion 4 adjacent its front edge 12.

Naturally, the principle of the invention remaining the same, the details of realization and forms of embodiment can be varied widely in relation to what has been described and illustrated, without thereby departing from the scope of the present invention.

Claims

1. Motor vehicle seat comprising a cushion (4), a back (2), and support means for the seat (1) which allow an adjusting movement to be imparted to the seat in a longitudinal direction relative to the structure (P) of the motor vehicle, characterised in that:

-at least partially separate support means (5, 7; 5, 6; 101, 104; 104) are provided for the cushion (4) and the back (2) so that separate adjusting movements can be imparted to the cushion (4) and the back (2) along respective translation paths, and,

-the support means for the cushion (4; 5, 7; 101, 104) and the back (2; 5, 6; 104) are connected together kinematically (5) in such a way that the movement of one of the cushion (4) and the back - (2) involves the movement of the other of the cushion (4) and the back (2), and the extent of movement of the cushion (4) is a fraction of the extent of movement of the back (2).

2. Seat according to Claim 1, characterised in that the extent of movement of the cushion (4) is of the order of half the extent of movement of the back (2).

3. Seat according to Claim 1 or Claim 2, characterised in that the support means comprises at least one pivotable arm (5; 104) having one end (9; 105) hinged to the structure (P) of the motor vehicle, a free end (10; 106) for connection to the back (2, 8), and an intermediate region (11; 107) between the hinge end (9; 105)and the free end (10; 106) for connection to the cushion (4).

4. Seat according to Claim 3, characterised in that the intermediate region (11) is halfway between the hinge end (9) and the free end (10) of the at least one pivotable arm (5).

5. Seat according to any one of Claims 1 to 4, in which the cushion (4) has respective front and rear end edges (12, 13) relative to the structure (P) of the motor vehicle, characterised in that, during the adjusting movement in the forward direction relative to the structure (1) of the motor vehicle, the support means (5, 7; 101,104) for the cushion (4) impart a tilting movement to the cushion (4), which raises the rear edge (13) of the cushion (4).

6. Seat according to any one of Claims 1 to 5, characterised in that the support means (5, 6, 8) for the back (2) have a configuration such as to maintain the back (2) in a constant orientation relative to the structure (P) of the motor vehicle during the adjusting movement of the back (2).

7. Seat according to Claim 5 and Claim 6, characterised in that the support means comprise, on at least one side of the seat (1):

-first (5) and second (6) pivotable arms of substantially the same length, having respective hinge ends (9, 14) connected to the structure (P) of the motor vehicle and separated by a predetermined distance,and respective free ends (10, 15) connected to the back (8, 2) and separated by a distance equal to the said predetermined distance, the first arm (5) also having an intermediate region (11) between the hinge end (9) and the free end - (10) for connection to the cushion (4) in a position

between the front end edge (12) and rear end edge (13) of the cushion (4), and

-a third pivotable arm (7) having a hinge end (16) connected to the structure (P) of the motor vehicle and a free end (17) connected to the cushion (4) adjacent the rear end edge (13) of the cushion (4), the third arm (7) being situated in a position intermediate the first and second arms (5, 6) and having a length from its hinge end (16) to its free end (17) of less than the length of that portion of the first arm (5) between the hinge end (9) and the intermediate region (11) of the first arm.

8. Seat according to Claim 3 and Claim 5, characterised in that the at least one pivotable arm (104) is shaped so that the hinge end (105), the free end (106) and the intermediate region (107) are located at the vertices of a triangle,the vertex corresponding to the intermediate region (107) facing the rear of the seat (1).

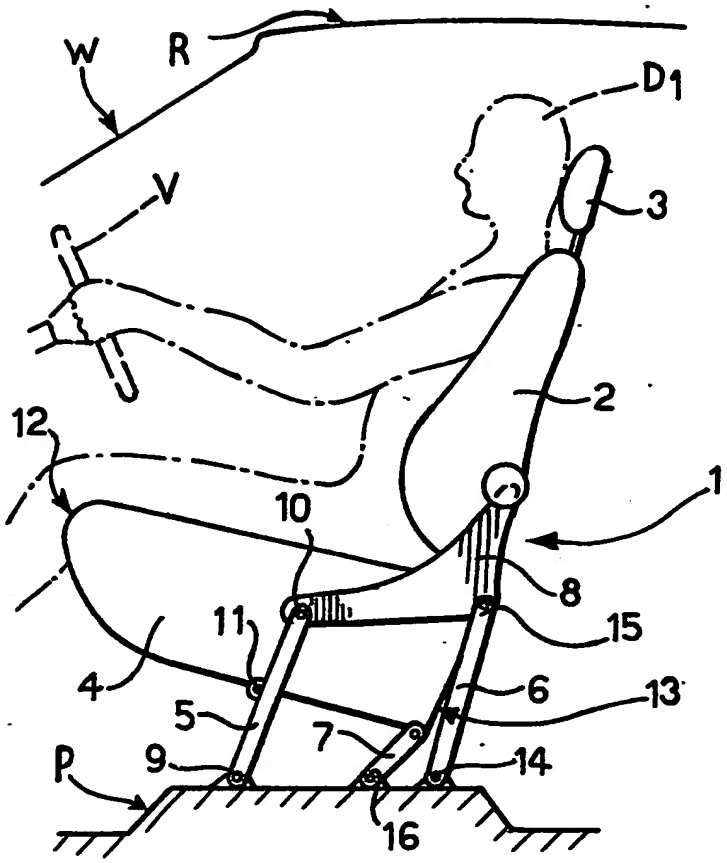

W
R
D1
V
3
2
12
10
1
8
11
15
4
6
13
5
7
P
9
14
16

FIG. 1

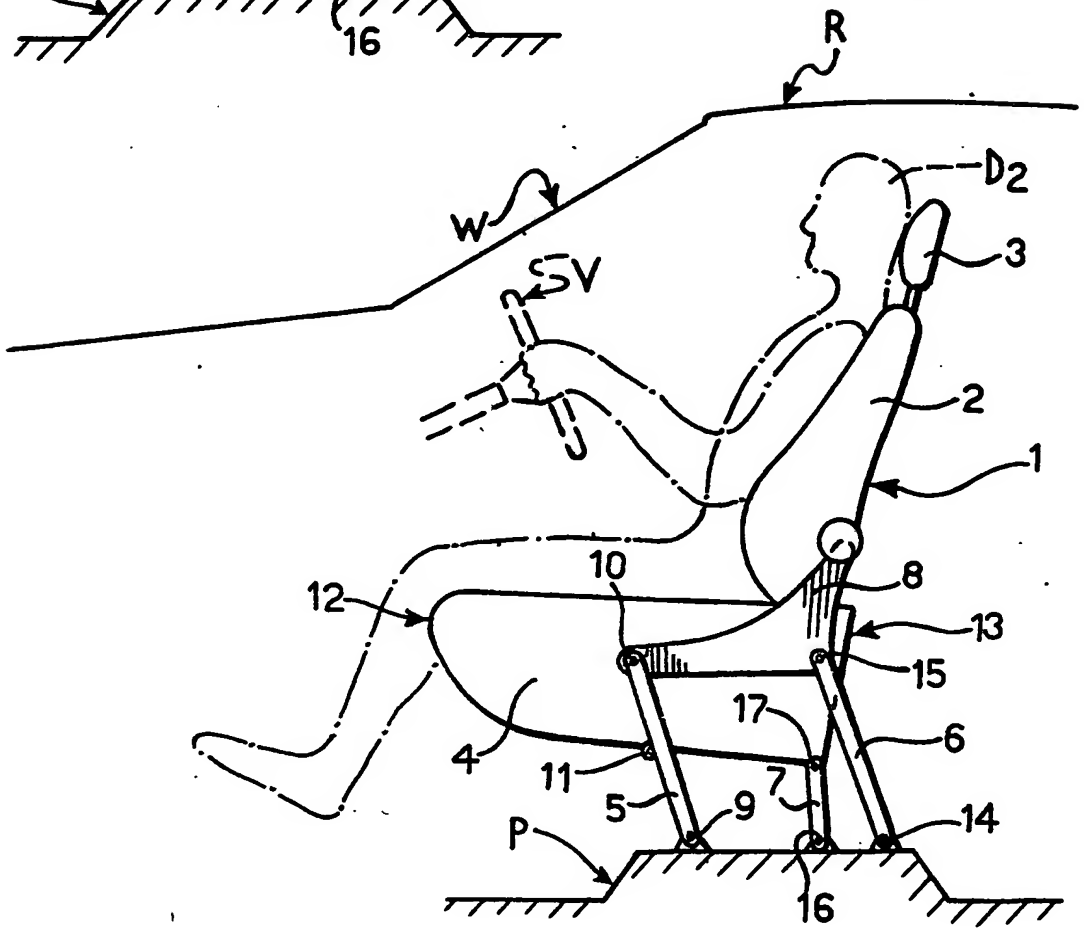
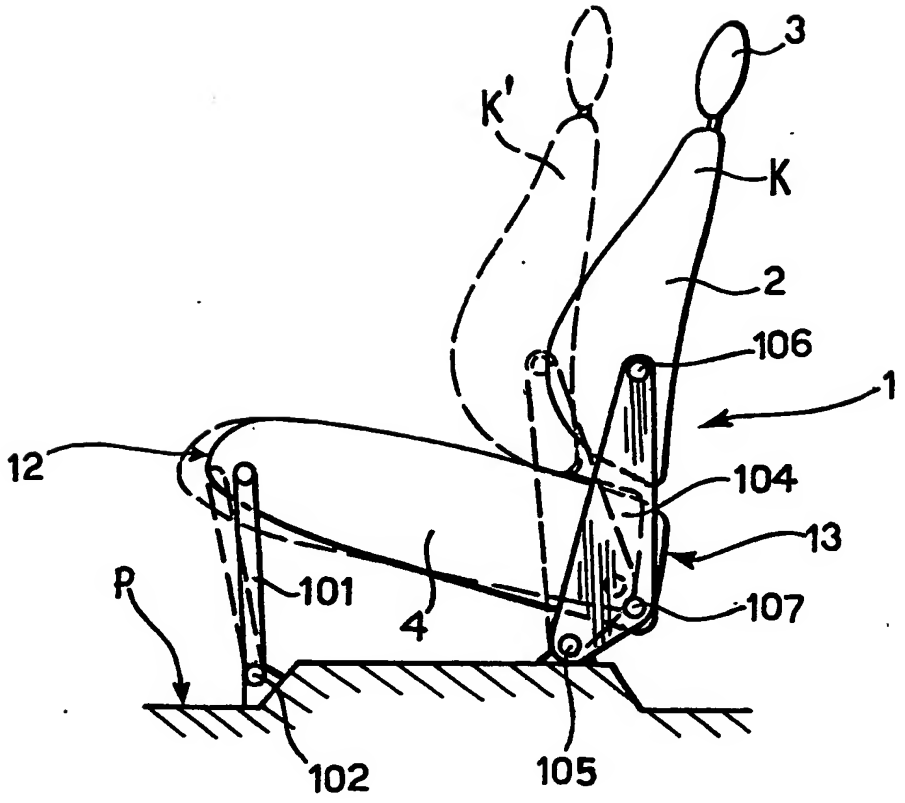

R
D2
W
3
SV
2
1
10
8
12
13
15
17
6
4
11
7
5
9
14
P
16

FIG. 2

FIG. 3



European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 86 83 0088

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-3 368 840 (DANGAUTHIER) * Column 4, lines 24-44; figure *	1	B 60 N 1/02
A	US-A-3 879 007 (BARTON)		
A	US-A-3 711 149 (CARTER)		
A	US-A-3 356 413 (RADKE)		
A	US-A-1 860 612 (EDMOND)		
A	US-A-2 082 297 (MILLER)		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	FR-A-1 061 595 (BREMSHEV)		B 60 N 1/00 B 60 R 21/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10-09-1986	HORVATH R.C.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503 03.82